Table 1. Summary of hypotheses, corresponding specific predictions, and results.

Hypotheses & Specific Predictions	Prediction supported? Overall	1966	1977	1999	Results
Tree size and microenvironment					
Larger, taller trees have lower Rt.					
Rt decreases with stem diameter (DBH).	~	~	~	~	
Rt decreases with height (H).	~yes	~yes	~yes	~yes	Tables 5, S5
Trees with more exposed crowns have lower Rt.					
Dominant trees have lowest Rt.	~	~	~	~	
Correcting for H, dominant trees have lowest Rt.	~no**	~no	~yes	~no	Tables 5, S5
Small trees (lower root volume) in drier microhabitats have lower Rt.					
There is a negative interactive effect between H and topographic wetness index.	~no	~no	~no	~no	Tables 5, S5
Species traits					
Species' traits–particularly leaf hydraulic traits–predict Rt.					
Wood density correlates (positively or negatively) to Rt.	-	-	-	-	Tables 4, S4
Leaf mass per area correlates positively to Rt.	-	no	-	-	Tables 4, S4
Ring-porous species have higher Rt than diffuse- or semi-ring- porous.	-	yes*	**	yes	Tables 4, S4
Percent loss leaf area upon desiccation correlates negatively with Rt.	~yes	~yes	~-*	(yes)	Tables 5, S5
Water potential at turgor loss correlates negatively with Rt.	-	-	~yes	(yes)	Tables 5, S5

Parentheses indicate that the prediction was supported by one but not all of the top full models (Table **5**). Dash symbols indicate that the response was not significant, or not represented in any of the top full models. Asterisks indicate that the Rt_{ARIMA} model yielded a different result: *different significance in Rt_{ARIMA} model **Rt_{ARIMA} model had a significant trend in the opposite direction of the Rt model (if significant) or the prediction (if no signficant trend in Rt model).

TILDAS (~) indicate that we don't currently have a (full) test of this prediction (issue 99)

Table 2. Summary of dependent and independent variables examined here, along with units, definitions, and sample sizes.

variable	symbol	units	description	category	n
Dependent variables					
drought resistance	Rt	-	ratio of growth during drought year to mean growth of the 5 years prior.	-	1596
	Rt_{ARIMA}	-	ratio of growth during drought year to growth predicted by ARIMA model.	-	1596
Independent variables					
drought year	Y	-	year of drought	1966	478
				1977	547
				1999	571
tree size					
diameter breast height	DBH	cm	DBH in drought year	-	all
height	H	m	estimated H in drought year	-	all
microhabitat					
crown position		-	2018 crown position	dominant (D)	31
				co-dominant (C)	231
				intermediate (I)	224
				suppressed (S)	101
topographic wetness index	TWI	-	steady-state wetness index based on slope and upstream contributing area	-	all
species' traits					
wood density	WD	g cm^{-3}	dry mass of a unit volume of fresh wood	-	all
leaf mass per area	LMA	kg m^{-2}	ratio of leaf dry mass to fresh leaf area	-	all
xylem porosity		-	vessel arrangement in xylem	ring (R)	408
				semi-ring (SR)	31
				diffuse (D)	178
turgor loss point	π_{tlp}	MPa	water potential at which leaves wilt	-	all
percent loss area	PLA_{dry}	%	percent loss of leaf area upon dessication	-	all

Table 3. Overview of analyzed species, listed in order of their relative contributions to woody stem productivity ($ANPP_{stem}$) in the plot, along with numbers and sizes sampled, and species traits. Variable abbreviations are as in Table 2.

			DBH (cm)		species traits (mean +/- sd)				
species	$\% ANPP_{stem}$	n cores	mean	range	WD ($g\,cm^{-3}$)	LMA ($g\,cm^{-2}$)	xylem porosity	π_{tlp} (Mpa)	PLA (%)
Liriodendron tulipifera (LITU)	47.1	98	368.54	100 - 1004	0.4 ± 0.03	46.92 ± 12.38	diffuse	-1.92 ± 0.17	19.56 ± 2.06
Quercus alba (QUAL)	10.7	61	471.51	114 - 791	0.61 ± 0.02	75.8 ± 11.05	ring	-2.58 ± 0.08	8.52 ± 0.37
Quercus rubra (QURU)	10.1	69	548.79	110.7 - 1480	0.62 ± 0.02	71.13 ± 6.70	ring	-2.64 ± 0.28	11.01 ± 0.84
Quercus velutina (QUVE)	7.8	77	541.38	160.2 - 1142	0.65 ± 0.04	48.69 ± 3.30	ring	-2.39 ± 0.15	13.42 ± 0.84
Quercus montana (QUPR)	4.8	59	422.48	105 - 872	0.61 ± 0.01	71.77 ± 40.17	ring	-2.36 ± 0.09	11.75 ± 1.37
Fraxinus americana (FRAM)	3.8	62	353.63	64 - 947.3	0.56 ± 0.01	43.28 ± 4.78	ring	-2.1 ± 0.36	13.06 ± 1.06
Carya glabra (CAGL)	3.7	31	313.89	98 - 985	0.62 ± 0.04	42.76 ± 0.94	ring	-2.13 ± 0.50	21.09 ± 5.48
Juglans nigra (JUNI)	2.1	31	481.42	242 - 870	1.09 ± 0.09	72.13 ± 7.10	semi-ring*	-2.76 ± 0.21	24.64 ± 8.72
Carya cordiformis (CACO)	2.0	13	271.87	107 - 615	0.83 ± 0.10	45.86 ± 15.60	ring	-2.13 ± 0.45	17.22 ± 2.25
Carya tomentosa (CATO)	2.0	13	209.74	121 - 322.1	0.83	45.36	ring	-2.2	16.56
Fagus grandifolia (FAGR)	1.5	80	235.11	112 - 1072	0.62 ± 0.03	30.68 ± 4.94	diffuse	-2.57	9.45 ± 1.25
Carya ovalis (CAOVL)	1.1	23	352.87	149 - 660	0.96 ± 0.33	47.6 ± 3.95	ring	-2.48 ± 0.04	14.8 ± 6.34

* Semi-ring porosity is intermediate between ring and diffuse. We group it with diffuse-porous species for more even division of species between categories.

Table 4. Individual tests of species traits as drivers of drought resistance (Rt).

		all droughts		1966		1977		1999	
variable	category	ΔAICc	coefficients	ΔAICc	coefficients	ΔAICc	coefficients	ΔAICc	coefficients
xylem porosity	R	-4.53	0.0680	2.44**	0.190	1.68*	-0.151	4.01**	0.1580
	D/SR	NA	0.0000		0.000		0.000		0.0000
PLA		-2.85	-0.0140	8.97**	-0.025	-0.27	-0.010	-0.91	-0.0070
LMA		-12.76	0.0001	-1.9	0.001	-1.66	-0.002	-2.07	0.0001
π_{tlp}		-2.22	-0.1620	-1.78	-0.093	1.27*	-0.251	-0.52	-0.1530
WD		-3.97	-0.0380	-1.17	-0.219	-1.51	-0.151	0.44	0.2650

Variable abbreviations are as in Table 2. ΔAICc is the AICc of a model excluding the trait minus that of the model including it.

*ΔAICc > 1: variable meets ΔAICc criterion for inclusion in full model

**ΔAICc > 2: variable is considered significant as an individual predictor (and meets ΔAICc criterion for inclusion in full model)

Table 5. Summary of top full models for each drought instance.

							crown position					
drought	ΔAICc	R^2	Intercept	$ln[H]$	$ln[TWI]$	$ln[H] * ln[TWI]$	D	C	I	S	PLA	π_{tlp}
all	**0.000**	**0.11**	**1.733**	**-0.245**	**-0.335**	**0.088**	**-0.036**	**0**	**-0.039**	**-0.056**	**-0.014**	**-**
1966	**0.000**	**0.26**	**2.265**	**-0.349**	**-0.336**	**0.111**	**-0.041**	**0**	**0.016**	**-0.062**	**-0.024**	**-**
1977	**0.000**	**0.23**	**0.902**	**-0.152**	**-0.358**	**0.078**	**-0.069**	**0**	**-0.029**	**0.035**	**-**	**-0.253**
1999	**0.000**	**0.21**	**1.152**	**-0.141**	**-0.229**	**0.046**	**0.001**	**0**	**-0.075**	**-0.088**	**-**	**-0.151**
	0.385	0.21	1.610	-0.141	-0.227	0.046	-0.001	0	-0.077	-0.091	-0.007	-

Models are ranked by AICc. Shown are all models whose AICc value falls within 1.0 (ΔAICc<1) of the best model (bold).

Figure Legends

Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal drougths (a) and community-wide responses Time series plot (**a**) shows peak growing season (May-August) climate conditions and residual chronologies for each species. PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (**b**) show the distribution of resistance values for each drought.

Figure 2. Height profiles in growing season climatic conditions and tree heights by crown position Shown are averages (± SD) of daily maxima and minima of (**a**) wind speed, (**b**) relative humidity (RH), and (**c**) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (**d**) 2018 tree heights by canopy position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.

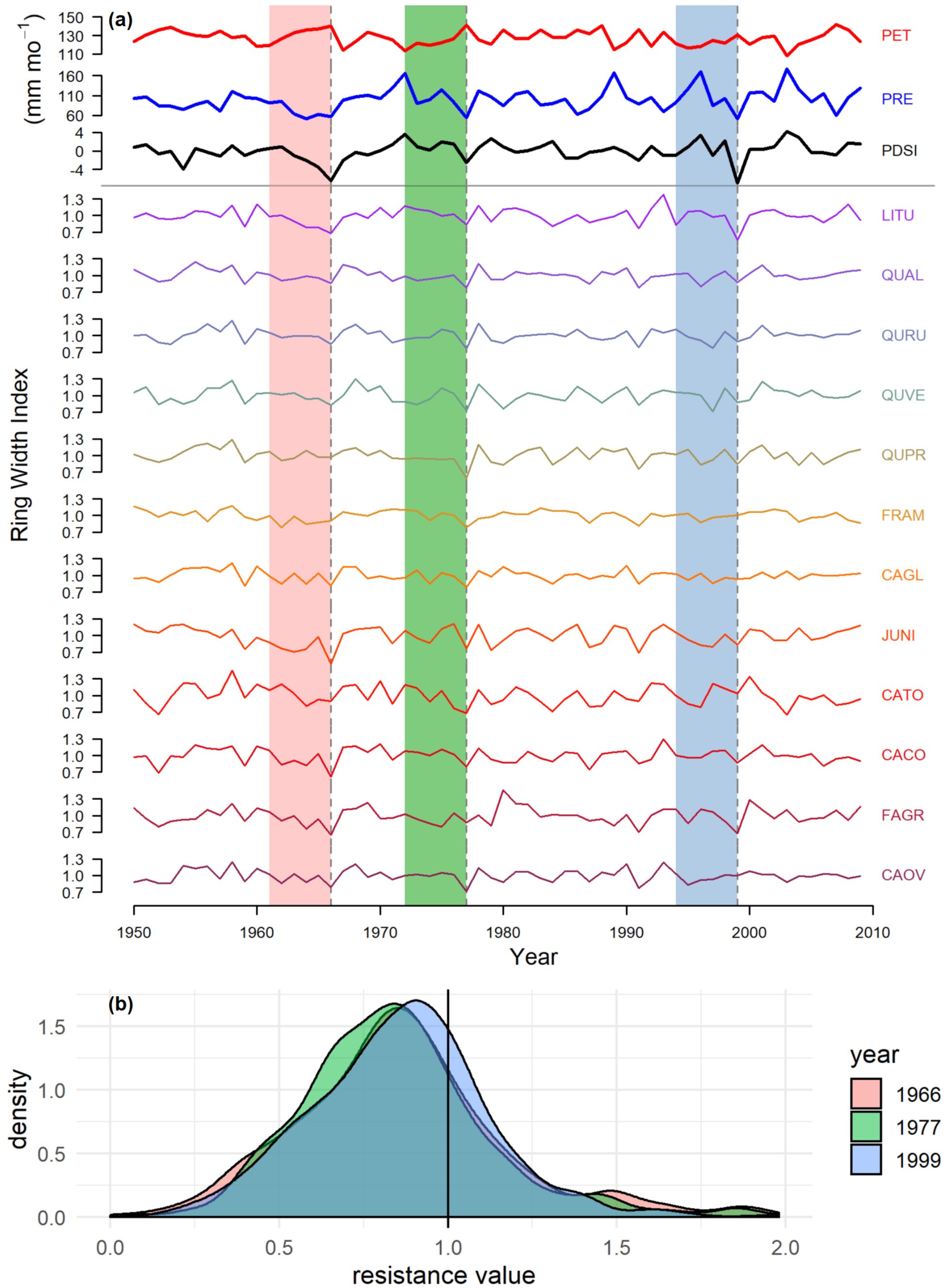

Figure 1. Climate and species-level growth responses over our study period, highlighting the three focal droughts (a) and community-wide responses Time series plot (a) shows peak growing season (May-August) climate conditions and residual chronologies for each species. PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (b) show the distribution of resistance values for each drought.

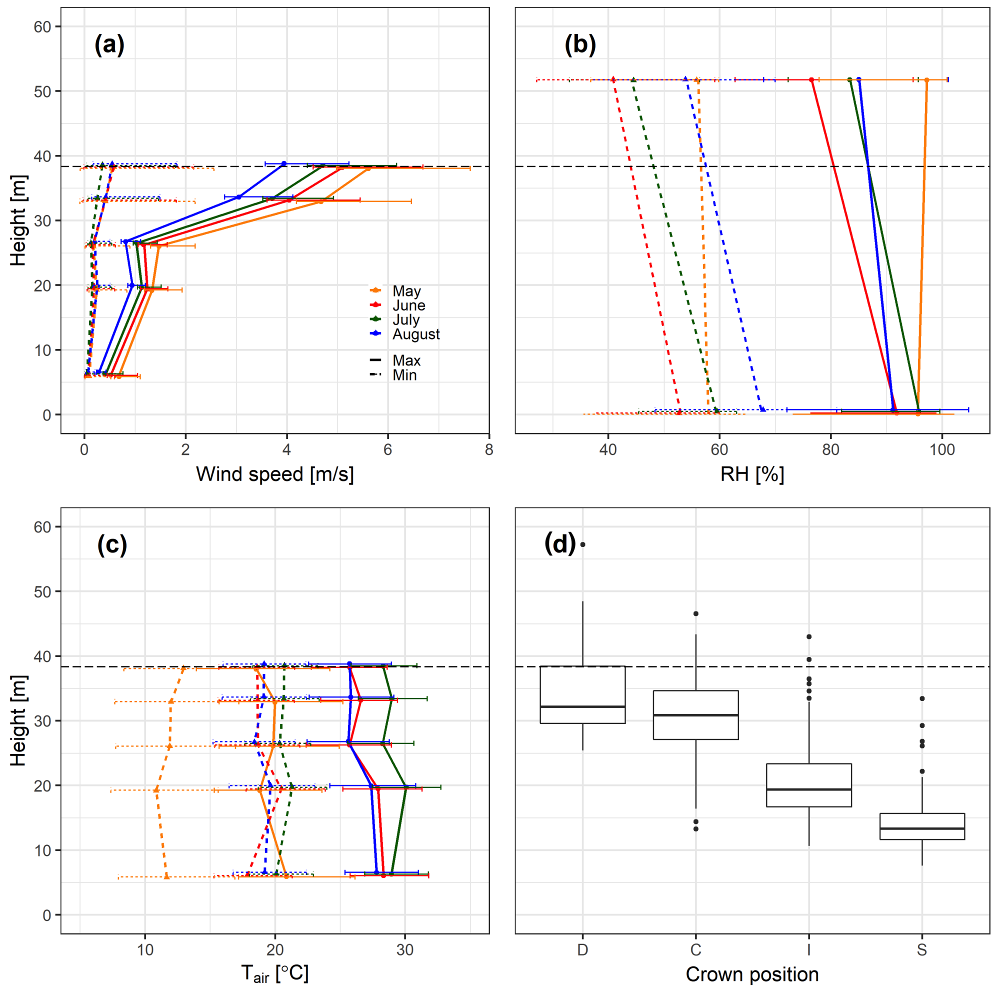

Figure 2. Height profiles in growing season climatic conditions, tree heights by crown position, and leaf hydraulic traits The top row shows averages (± SD) of daily maxima and minima of (a) wind speed, (b) relative humidity (RH), and (c) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (d) 2018 tree heights by canopy position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.